MARICOPA ASSOCIATION of GOVERNMENTS

MAG ITS Strategic Plan Update

Executive Summary

Prepared by:

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INTRODUCTION

In September of 1999, the Maricopa Association of Governments (MAG) embarked upon an update of the region's Intelligent Transportation Systems (ITS) Strategic Plan originally prepared in 1995. Since the original plan was developed, many of the projects identified as high priority have been deployed throughout the region and are operational. Local agencies are looking ahead to build upon the existing systems and infrastructure and plan for future transportation needs.

The MAG ITS Strategic Plan Update provides a roadmap for deploying ITS to address regional transportation needs for the next 20 years. Consistency with the National ITS Architecture was a key element of the Plan and this will help to position the region for future federal funding opportunities.

Key components of the ITS Strategic Plan included:

- Stakeholder Involvement;
- Inventory of Existing and Planned ITS;
- ITS User Services and Market Packages;
- Regional ITS Architecture;
- ITS Telecommunications Plan;
- ITS Training and Capacity Building Plan;
- ITS Operational and Implementation Strategies;
- ITS Project Evaluation Plan; and
- ITS Implementation Plan.

Under the auspices of the MAG ITS Committee, a multijurisdictional group of ITS champions was established to guide, review project deliverables, and provide input to the MAG ITS Strategic Plan Update. The Regional ITS Stakeholders Group (RISG) was comprised of representatives from public, private, academic and public safety agencies, and membership was open to anyone interested. The RISG met monthly to review the Plan's progress, provide feedback to the consultant team about project deliverables, and establish consensus on future directions for the Plan. Vision and Mission Statements for the Plan Update were established early in the project:

> ***Vision –*** Enhance the quality of life in the MAG region by applying technology and information-sharing to improve the multimodal transportation system.
>
> ***Mission –*** To plan, implement and evaluate appropriate ITS technologies, consistent with the national ITS program, that address regional goals and objectives of the transportation users.

STAKEHOLDER INVOLVEMENT

A multi-step plan was developed and carried out to involve stakeholders throughout the region. They were invited to participate in the Plan's development through a variety of avenues. Focus group workshops, questionnaires, a project Web site, a toll-free hotline, and a project e-mail address allowed public and private stakeholders to contribute to the identification process. The workshops and questionnaires yielded valuable information about regional transportation needs from a broad range of perspectives. Many of the high priority needs identified by the regional stakeholders focused on improved signal coordination, enhancements to transit service, improving incident response and management, and providing timely, accurate information to motorists.

A project Web site (http://www.mag.maricopa.gov/ITS/index.html) was developed and included copies of all technical memoranda, project newsletters, and meeting minutes. Stakeholders also were kept informed by four project newsletters distributed at key points in the Plan's progress.

INVENTORY OF EXISTING AND PLANNED ITS

In order to develop a comprehensive update to the region's ITS Strategic Plan, it was important to first consider what infrastructure was already in place or programmed for the near-term. The MAG region is a sophisticated ITS community in that a substantial investment has been made at the state, county, and municipal levels to plan and implement ITS programs.

Early in the ITS Strategic Plan update an ITS inventory was conducted of agencies in the region, including the Arizona Department of Transportation (ADOT), Maricopa County Department of Transportation (MCDOT), municipalities, transit agencies, airports, emergency management, commercial vehicles, and the private sector. The AZTech™ Model Deployment Initiative was also included in the inventory. The inventory focused on identifying existing field infrastructure (CCTV cameras, variable message signs, detectors, etc.), types of communications infrastructure, traffic management and operations centers, any in-vehicle equipment, and other ITS equipment and capabilities.

In addition to identifying existing infrastructure, planned ITS also were included in the inventory. This allowed the Strategic Plan Update to take into account existing as well as planned infrastructure prior to developing recommendations.

ITS USER SERVICES AND MARKET PACKAGES

The needs and priorities identified by the stakeholders were matched with the 31 ITS user services identified in the National ITS Architecture to determine which ones best addressed the regional needs. User services are broad categories of ITS tools used by travelers and transportation providers. The candidate user services were then prioritized as to need or criticalness for the successful deployment of ITS in the region.

Next, market packages were selected identifying the required technologies to meet the specific regional needs. Market packages are groups of ITS technologies that work together to deliver a transportation service, and are essentially more refined user services.

The following deployment timeframes for the MAG region were established. Selected user services and market packages were designated as short-term (2002-2006), mid-term (2007-2011), or long-term (2012-2021) deployments.

REGIONAL ITS ARCHITECTURE

The purpose of the MAG regional ITS architecture is to ensure that integrated ITS are deployed in the MAG region. This integration includes the logical, physical, and institutional components of the regional ITS program.

Using the stakeholder needs, user services and market packages, logical processes were developed to support the desired functionality of the regional ITS. The following processes were selected to fulfill the transportation needs of the region:

- Manage Traffic;
- Manage Commercial Vehicles;
- Provide Vehicle Monitoring and Control;
- Manage Transit;
- Manage Emergency Services;
- Provide Driver and Traveler Services;
- Provide Electronic Payment Services; and
- Manage Archived Data.

These processes were identified as public, private or public/private, depending on the type of agency that would be likely to deploy or support them. This functional basis was then used to develop a physical system architecture for the region.

The project team mapped the existing ITS infrastructure in the MAG region to the National ITS Architecture. Using guidelines from the National ITS Architecture, a future ITS architecture for the MAG region also was developed. In addition to complying with the National ITS Architecture, the MAG regional ITS architecture was coordinated with the existing architectures for AZTech, ADOT's Freeway Management System, and Arizona's statewide architecture.

An architecture vision based on the future physical ITS architecture was also developed. Each subsystem in the architecture vision is identified as public or private depending on the sector that will be responsible for the deployment. The architecture vision includes existing and planned elements, and provides for the addition of new components and new ITS cities. Likely communications infrastructure used to connect the various subsystems also is identified. The MAG Regional ITS Architecture Vision is presented in **Figure 1**.

The status of the existing and recommended subsystem implementation in the MAG region was determined for each agency involved in ITS deployment and is presented in **Table 1**. The status of each subsystem is indicated as Full Implementation, Partial Implementation, Low/Planning/Design Phase of Implementation, No Implementation, or Not Applicable.

The future institutional architecture that was developed for the MAG region focuses on two primary functions, ITS planning and ITS operations. The MAG Regional Council, Management Committee, Transportation Review Committee and ITS Committee will have primary responsibilities for ITS planning in the Region. The AZTech™ Executive Committee and Transportation Operations Working Group will have the primary responsibility for regional ITS operations. Close coordination between planning and operations groups is critical to the successful deployment of ITS in the region. In the future ITS institutional framework for the MAG region, planning and operations will be coordinated at the highest level between the reconstituted AZTech™ Executive Committee and the MAG Transportation Review Committee. Similarly, the AZTech™ Transportation Operations Working Group and the MAG ITS Committee will coordinate ITS program activities.

Key recommendations from the regional ITS architecture component of the MAG ITS Strategic Plan Update include:

- The MAG ITS architecture vision outlined in the Strategic Plan should serve as a roadmap for future project deployments and phasing;
- MAG should consider ITS as a planning element in all future transportation planning activities; and
- U.S. Department of Transportation (USDOT) adopted ITS standards should be used where available and applicable.

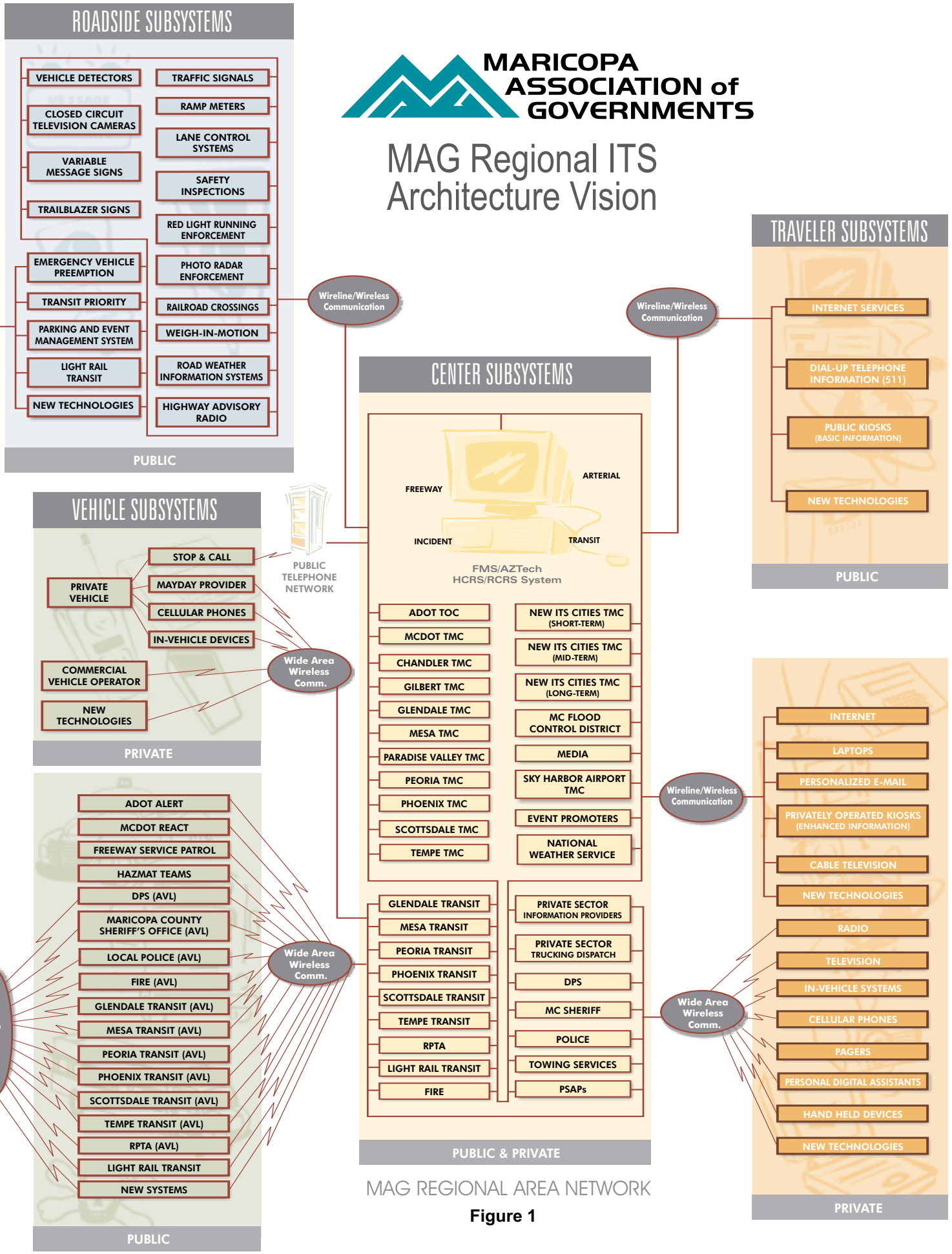

ROADSIDE SUBSYSTEMS
VEHICLE DETECTORS
CLOSED CIRCUIT TELEVISION CAMERAS
VARIABLE MESSAGE SIGNS
TRAILBLAZER SIGNS
EMERGENCY VEHICLE PREEMPTION
TRANSIT PRIORITY
PARKING AND EVENT MANAGEMENT SYSTEM
LIGHT RAIL TRANSIT
NEW TECHNOLOGIES
TRAFFIC SIGNALS
RAMP METERS
LANE CONTROL SYSTEMS
SAFETY INSPECTIONS
RED LIGHT RUNNING ENFORCEMENT
PHOTO RADAR ENFORCEMENT
RAILROAD CROSSINGS
WEIGH-IN-MOTION
ROAD WEATHER INFORMATION SYSTEMS
HIGHWAY ADVISORY RADIO
PUBLIC
MARICOPA ASSOCIATION of GOVERNMENTS
MAG Regional ITS Architecture Vision
TRAVELER SUBSYSTEMS
INTERNET SERVICES
DIAL-UP TELEPHONE INFORMATION (511)
PUBLIC KIOSKS (BASIC INFORMATION)
NEW TECHNOLOGIES
PUBLIC
Wireline/Wireless Communication
Wireline/Wireless Communication
CENTER SUBSYSTEMS
FREEWAY
ARTERIAL
INCIDENT
TRANSIT
FMS/AZTech HCRS/RCRS System
ADOT TOC
MCDOT TMC
CHANDLER TMC
GILBERT TMC
GLENDALE TMC
MESA TMC
PARADISE VALLEY TMC
PEORIA TMC
PHOENIX TMC
SCOTTSDALE TMC
TEMPE TMC
NEW ITS CITIES TMC (SHORT-TERM)
NEW ITS CITIES TMC (MID-TERM)
NEW ITS CITIES TMC (LONG-TERM)
MC FLOOD CONTROL DISTRICT
MEDIA
SKY HARBOR AIRPORT TMC
EVENT PROMOTERS
NATIONAL WEATHER SERVICE
GLENDALE TRANSIT
MESA TRANSIT
PEORIA TRANSIT
PHOENIX TRANSIT
SCOTTSDALE TRANSIT
TEMPE TRANSIT
RPTA
LIGHT RAIL TRANSIT
FIRE
PRIVATE SECTOR INFORMATION PROVIDERS
PRIVATE SECTOR TRUCKING DISPATCH
DPS
MC SHERIFF
POLICE
TOWING SERVICES
PSAPs
PUBLIC & PRIVATE
VEHICLE SUBSYSTEMS
PRIVATE VEHICLE
STOP & CALL
MAYDAY PROVIDER
CELLULAR PHONES
IN-VEHICLE DEVICES
COMMERCIAL VEHICLE OPERATOR
NEW TECHNOLOGIES
PRIVATE
PUBLIC TELEPHONE NETWORK
Wide Area Wireless Comm.
Wireline/Wireless Communication
INTERNET
LAPTOPS
PERSONALIZED E-MAIL
PRIVATELY OPERATED KIOSKS (ENHANCED INFORMATION)
CABLE TELEVISION
NEW TECHNOLOGIES
RADIO
TELEVISION
IN-VEHICLE SYSTEMS
CELLULAR PHONES
PAGERS
PERSONAL DIGITAL ASSISTANTS
HAND HELD DEVICES
NEW TECHNOLOGIES
Wide Area Wireless Comm.
PRIVATE
Dedicated Short-Range Comm.
ADOT ALERT
MCDOT REACT
FREEWAY SERVICE PATROL
HAZMAT TEAMS
DPS (AVL)
MARICOPA COUNTY SHERIFF'S OFFICE (AVL)
LOCAL POLICE (AVL)
FIRE (AVL)
GLENDALE TRANSIT (AVL)
MESA TRANSIT (AVL)
PEORIA TRANSIT (AVL)
PHOENIX TRANSIT (AVL)
SCOTTSDALE TRANSIT (AVL)
TEMPE TRANSIT (AVL)
RPTA (AVL)
LIGHT RAIL TRANSIT
NEW SYSTEMS
Wide Area Wireless Comm.
PUBLIC
MAG REGIONAL AREA NETWORK

Figure 1

Table 1 – Status of Existing and Future Subsystem Implementation in the MAG Region

	Subsystems																		
	Centers									Roadside				Traveler		Vehicle			
Responsible Agency	Regional Archived Data Mgmt Sys	Commercial Vehicle Admin	Emergency Management	Emissions Management	Fleet and Freight Management	Information Service Provider	Toll Administration	Traffic Management	Transit Management	Commercial Vehicle Check	Parking Management	Roadway	Toll Collection	Personal Info Access	Remote Traveler Support	Commercial Vehicle	Emergency Vehicle	Transit Vehicle	Vehicle
MAG[1]	◐	○	◐	◐	◐	◐	N/A	◐	◐	◐	○	◐	N/A	◐	◐	◐	◐	◐	◐
RPTA[1]	◌	N/A	N/A	N/A	N/A	◐	N/A	N/A	◐	N/A	N/A	○	N/A	○	◐	N/A	N/A	◐	N/A
ADOT	◐	○	◐	◐	○	◐	N/A	◐	N/A	◐	N/A	◐	N/A	N/A	◐	N/A	◐	N/A	N/A
MCDOT	○	N/A	○	N/A	○	◐	N/A	◐	N/A	N/A	○	◐	N/A	N/A	◐	N/A	◌	N/A	N/A
Chandler Traffic	◌	N/A	N/A	N/A	N/A	◐	N/A	◐	N/A	N/A	◌	◐	N/A	N/A	◐	N/A	N/A	N/A	N/A
Gilbert Traffic	◌	N/A	N/A	N/A	N/A	◐	N/A	○	N/A	N/A	◌	◐	N/A	N/A	◐	N/A	N/A	N/A	N/A
Glendale Traffic	◌	N/A	N/A	N/A	N/A	◐	N/A	○	N/A	N/A	◌	◐	N/A	N/A	◐	N/A	N/A	N/A	N/A
Mesa Traffic	◌	N/A	N/A	N/A	N/A	◐	N/A	◐	N/A	N/A	◌	◐	N/A	N/A	◐	N/A	N/A	N/A	N/A
Paradise Valley Traffic	◌	N/A	N/A	N/A	N/A	◌	N/A	◐	N/A	N/A	◌	◐	N/A	N/A	◐	N/A	N/A	N/A	N/A
Peoria Traffic	◌	N/A	N/A	N/A	N/A	◌	N/A	○	N/A	N/A	◌	◐	N/A	N/A	◐	N/A	N/A	N/A	N/A
Phoenix Traffic	◌	N/A	N/A	N/A	N/A	○	N/A	◐	N/A	N/A	◐	◐	N/A	N/A	◐	N/A	N/A	N/A	N/A
Scottsdale Traffic	◌	N/A	N/A	N/A	N/A	○	N/A	◐	N/A	N/A	◌	◐	N/A	N/A	◐	N/A	N/A	N/A	N/A
Tempe Traffic	◌	N/A	N/A	N/A	N/A	◐	N/A	◐	N/A	N/A	○	◐	N/A	N/A	◐	N/A	N/A	N/A	N/A
New ITS Cities Traffic	◌	N/A	N/A	N/A	N/A	◌	N/A	◌	N/A	N/A	◌	◌	N/A	N/A	◌	N/A	N/A	N/A	N/A
Glendale Transit	◌	N/A	N/A	N/A	N/A	◌	N/A	N/A	◌	N/A	N/A	○	N/A	○	◐	N/A	N/A	◐	N/A
Mesa Transit	◌	N/A	N/A	N/A	N/A	◌	N/A	N/A	◐	N/A	N/A	○	N/A	○	◐	N/A	N/A	◐	N/A
Peoria Transit	◌	N/A	N/A	N/A	N/A	◌	N/A	N/A	◌	N/A	N/A	○	N/A	○	◐	N/A	N/A	◐	N/A
Phoenix Transit	◌	N/A	N/A	N/A	N/A	◐	N/A	N/A	◐	N/A	N/A	○	N/A	○	◐	N/A	N/A	◐	N/A
Scottsdale Transit	◌	N/A	N/A	N/A	N/A	◌	N/A	N/A	◐	N/A	N/A	○	N/A	○	◐	N/A	N/A	◐	N/A
Tempe Transit	◌	N/A	N/A	N/A	N/A	◌	N/A	N/A	◐	N/A	N/A	○	N/A	○	◐	N/A	N/A	◐	N/A
DPS	N/A	N/A	○	N/A	N/A	◌	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	◐	N/A	◌	N/A	N/A
MC Sheriff's Office	N/A	N/A	○	N/A	N/A	◌	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	◌	N/A	◌	N/A	N/A
Local Police	N/A	N/A	◐	N/A	N/A	◌	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	◌	N/A	◐	N/A	N/A
Fire	N/A	N/A	◐	N/A	N/A	◌	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	◌	N/A	◐	N/A	N/A
PSAPs	N/A	N/A	◐	N/A	N/A	◌	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	◌	N/A	N/A	N/A	N/A
Airports	N/A	N/A	N/A	N/A	N/A	◐	N/A	N/A	N/A	N/A	○	◌	N/A	N/A	◐	N/A	N/A	N/A	N/A
MC Flood Control	N/A	N/A	◌	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	○	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MC Environmental Services	N/A	N/A	N/A	◐	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Private Sector	◌	◌	◐	N/A	◐	◐	N/A	N/A	N/A	N/A	◌	◌	N/A	◐	◐	◐	N/A	N/A	◐

[1]Indicates the role of MAG and RPTA in coordination, funding, and policy making of subsystem implementation.

● - Full Implementation (Subsystem has been fully implemented to the level of functionality and coverage desired by the agency, and additional deployments of subsystem components will be added as needed or as funding becomes available in the future).

◐ - Partial Implementation (Subsystem has been partially implemented to the level of functionality and coverage desired by the agency, and additional deployments of subsystem components will be added as needed or as funding becomes available in the future).

○ - Low/Planning/Design Phase of Implementation (Subsystem is at a low level of implementation or is currently being planned or designed for implementation).

◌ - No Implementation (Subsystem has been identified as appropriate for the agency, however plans do not exist for implementation of this subsystem).

N/A - Not Applicable (Agency will not have primary responsibility for implementation of subsystem).

ITS TELECOMMUNICATIONS PLAN

An ITS Telecommunications Plan was developed for the MAG region to support the architecture vision as well as to foster a desired level of agency connectivity. This Plan considered the existing communication infrastructure and agencies already connected via the existing communications links. As new systems come on line and more agencies begin deploying ITS, a regional Wide Area Network (WAN) will be needed. A substantial amount of fiber is already in place from which to build this regional WAN, and the ITS Telecommunications Plan provides for a phased expansion of the fiber network based on available budget and agency communications requirements. The ITS Telecommunications Plan also identifies opportunities for shared-resource partnerships with the private sector to help offset the cost for communications infrastructure.

Figure 2 provides an overview of the recommended ITS Telecommunications Plan. Existing fiber optic communications, fiber to be installed by year 2003, and fiber to be installed by year 2006 are identified. Agencies to be connected through the regional WAN have also been identified.

Key recommendations from the ITS Telecommunications component of the MAG ITS Strategic Plan Update include:

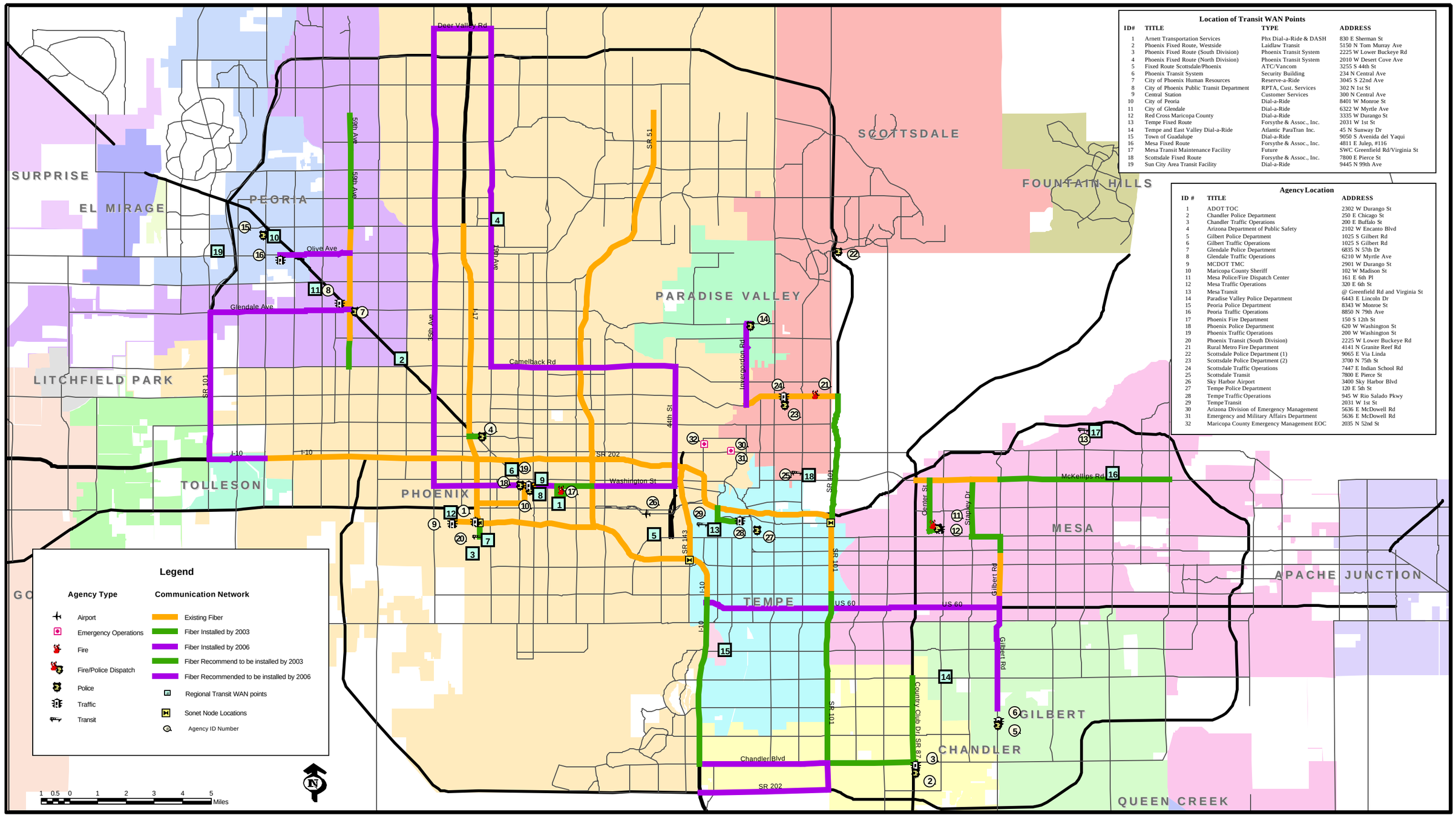
- Agencies should eliminate leased line service where possible and a regional fiber optic WAN should be installed to support center-to-center communications and data sharing among agencies;
- As other cities and agencies continue to grow they will need to be considered for connection to the regional WAN as they add new ITS infrastructure and staff;
- The ADOT Traffic Operations Center should continue to serve as the regional ITS hub for the ITS fiber network; and
- Agencies should coordinate with local utilities to explore infrastructure-sharing possibilities. Where possible, installation of empty conduit in existing trenching operations should be considered to accommodate future fiber optic needs.

ITS TRAINING AND CAPACITY BUILDING PLAN

Ongoing training and staff development will be critical to the long-term success of ITS in the MAG region. A Training and Capacity Building (TCB) Plan was developed that outlines training areas, needs, available workshops, and course materials as well as an action plan for TCB specific to the MAG region. A stakeholder survey identified priority areas for professional capacity building in the MAG region; including:

- Cost/Benefit Analysis;
- Regional Concept of Operations;
- Technology Analysis Range of Options;
- ITS Projects in the MPO Regional Transportation Plan/TIP;
- System Integration; and
- Capacity Analysis – Transmission: Wireline vs. Wireless.

Federal Highway Administration (FHWA)/National Highway Institute and related courses were identified to address the regional training needs. Web-based training also was identified as a cost-effective alternative.



Location of Transit WAN Points

ID#	TITLE	TYPE	ADDRESS
1	Arnett Transportation Services	Phx Dial-a-Ride & DASH	830 E Sherman St
2	Phoenix Fixed Route, Westside	Laidlaw Transit	5150 N Tom Murray Ave
3	Phoenix Fixed Route (South Division)	Phoenix Transit System	2225 W Lower Buckeye Rd
4	Phoenix Fixed Route (North Division)	Phoenix Transit System	2010 W Desert Cove Ave
5	Fixed Route Scottsdale/Phoenix	ATC/Vancom	3255 S 44th St
6	Phoenix Transit System	Security Building	234 N Central Ave
7	City of Phoenix Human Resources	Reserve-a-Ride	3045 S 22nd Ave
8	City of Phoenix Public Transit Department	RPTA, Cust. Services	302 N 1st St
9	Central Station	Customer Services	300 N Central Ave
10	City of Peoria	Dial-a-Ride	8401 W Monroe St
11	City of Glendale	Dial-a-Ride	6322 W Myrtle Ave
12	Red Cross Maricopa County	Dial-a-Ride	3335 W Durango St
13	Tempe Fixed Route	Forsythe & Assoc., Inc.	2031 W 1st St
14	Tempe and East Valley Dial-a-Ride	Atlantic ParaTran Inc.	45 N Sunway Dr
15	Town of Guadalupe	Dial-a-Ride	9050 S Avenida del Yaqui
16	Mesa Fixed Route	Forsythe & Assoc., Inc.	4811 E Juley, #116
17	Mesa Transit Maintenance Facility	Future	SWC Greenfield Rd/Virginia St
18	Scottsdale Fixed Route	Forsythe & Assoc., Inc.	7800 E Pierce St
19	Sun City Area Transit Facility	Dial-a-Ride	9445 N 99th Ave

Agency Location

ID #	TITLE	ADDRESS
1	ADOT TOC	2302 W Durango St
2	Chandler Police Department	250 E Chicago St
3	Chandler Traffic Operations	200 E Buffalo St
4	Arizona Department of Public Safety	2102 W Encanto Blvd
5	Gilbert Police Department	1025 S Gilbert Rd
6	Gilbert Traffic Operations	1025 S Gilbert Rd
7	Glendale Police Department	6835 N 57th Dr
8	Glendale Traffic Operations	6210 W Myrtle Ave
9	MCDOT TMC	2901 W Durango St
10	Maricopa County Sheriff	102 W Madison St
11	Mesa Police/Fire Dispatch Center	161 E 6th Pl
12	Mesa Traffic Operations	320 E 6th St
13	Mesa Transit	@ Greenfield Rd and Virginia St
14	Paradise Valley Police Department	6443 E Lincoln Dr
15	Peoria Police Department	8343 W Monroe St
16	Peoria Traffic Operations	8850 N 79th Ave
17	Phoenix Fire Department	150 S 12th St
18	Phoenix Police Department	620 W Washington St
19	Phoenix Traffic Operations	200 W Washington St
20	Phoenix Transit (South Division)	2225 W Lower Buckeye Rd
21	Rural Metro Fire Department	4141 N Granite Reef Rd
22	Scottsdale Police Department (1)	9065 E Via Linda
23	Scottsdale Police Department (2)	3700 N 75th St
24	Scottsdale Traffic Operations	7447 E Indian School Rd
25	Scottsdale Transit	7800 E Pierce St
26	Sky Harbor Airport	3400 Sky Harbor Blvd
27	Tempe Police Department	120 E 5th St
28	Tempe Traffic Operations	945 W Rio Salado Pkwy
29	Tempe Transit	2031 W 1st St
30	Arizona Division of Emergency Management	5636 E McDowell Rd
31	Emergency and Military Affairs Department	5636 E McDowell Rd
32	Maricopa County Emergency Management EOC	2035 N 52nd St

Figure 2

MAG ITS Strategic Plan Update
ITS Telecommunications Plan

Kimley-Horn and Associates, Inc.

MARICOPA ASSOCIATION of GOVERNMENTS

Key recommendations from the ITS Training and Capacity Building Plan component of the MAG ITS Strategic Plan Update include:

- MAG should serve as the regional TCB champion, and that a subcommittee or working group of the MAG ITS Committee provide ongoing coordination, guidance, and review of the regional TCB strategies. This regional champion will have responsibility for coordinating with the Local Technical Assistance Program (LTAP) and FHWA to bring the identified courses to local professionals, developing a training schedule, and promoting the training to MAG region agencies;
- As the regional TCB champion, MAG also should identify opportunities to partner with national professional associations (such as ITS America and the Institute of Transportation Engineers) and Arizona Universities to schedule specialized symposiums, workshops, and courses; and
- A centralized library should be developed to include relevant publications, copies of course material, and other resources for use by MAG partner agencies as well as a regional TCB.

ITS OPERATIONAL AND IMPLEMENTATION STRATEGIES

ITS Operational and Implementation Strategies were prepared to identify opportunities for regional operational collaboration, opportunities for shared operations and maintenance agreements, procedures for multi-jurisdictional issues, and costs and resource requirements of ITS components. Regional collaboration discussed the agencies involved in planning, implementation, operations and maintenance of various systems. A key component of the ITS Operational and Implementation Strategies was the identification of agency system responsibilities. For each major ITS deployment that existed or is planned in the MAG region, the agency or group of agencies typically responsible for planning, implementation, operations and maintenance have been identified. Agency system responsibilities are presented in **Table 2**. Procedures for addressing multi-jurisdictional issues focusing primarily on improving the resolution of operations and maintenance issues between jurisdictions were presented. The ITS Deployment Analysis System (IDAS) software was used to provide estimates of cost and resources for ITS deployments under consideration in the MAG region.

Table 2 – Agency System Responsibilities

System	Planning	Implementation	Operations	Maintenance
Freeway Management System	MAG/ADOT	ADOT	ADOT	ADOT
Freeway Service Patrol	MAG/DPS/ADOT	MAG/DPS/ADOT	DPS	DPS
Highway Condition Reporting System	ADOT	ADOT	ADOT	ADOT
ALERT – Incident Response	ADOT	ADOT	ADOT	ADOT
REACT – Incident Response	MCDOT	MCDOT	MCDOT	MCDOT
SMART Corridors	MAG	AZTech™/Local	Local	Local
Parking Management	Local	Local	Local	Local
Central Signal Control Systems	MAG/Local	Local	Local	Local
Transit Systems	RPTA/Local	RPTA/Local	RPTA/Local	RPTA/Local
Traffic Management Centers	MAG/Local	AZTech™/Local	AZTech™/Local	AZTech™/Local
TMC Information Sharing	MAG/Local	AZTech™/Local	AZTech™/Local	AZTech™/Local
azfms.com Website	ADOT	ADOT	ADOT	ADOT
511	ADOT/MAG	ADOT	ADOT	ADOT
Additional Traveler Information Systems	MAG/AZTech™/ Private	AZTech™/Private	Private	Private

Key recommendations from the ITS Operational and Implementation Strategies component of the MAG ITS Strategic Plan Update include:

- Member jurisdictions should make all efforts to maintain consistency and compatibility with the MAG ITS Strategic Plan;
- Opportunities to develop and expand the shared operations of ITS across multiple jurisdictions, including joint location of traffic operations with emergency services dispatch, should be investigated and encouraged;
- MAG should define the regional ITS goals for operations by developing a Regional Concept of Operations;
- Jurisdictions should investigate developing joint maintenance agreements to improve the maintenance of ITS equipment and reduce agency costs. The MAG ITS Committee should encourage and facilitate the development of these agreements;
- The budgeting procedures used to plan for operational expenditures should be enhanced to minimize the chance of future funding shortfalls. These budgeting procedures should consider the full costs of ITS management and operations, and also anticipate the impact on management and operations expenditures of incremental expansion of the ITS infrastructure; and
- MAG and its member agencies should continue to pursue available federal funding for ITS projects as well as continue to explore opportunities for public/private partnerships to deploy ITS in the MAG region.

ITS PROJECT EVALUATION

An Evaluation Plan was prepared that includes a framework for conducting ITS evaluations on future projects in the MAG region. This framework includes an overview of the FHWA-recommended evaluation process, agency responsibilities, evaluation data collection and usage considerations, the resources and infrastructure needed to conduct various types of evaluations, and potential uses for evaluation data in the regional transportation planning process. The evaluation strategies presented in the Evaluation Plan provide agencies in the MAG region with a foundation and tools to develop evaluation activities once projects are ready for deployment.

Key recommendations from the ITS Evaluation Plan component of the MAG ITS Strategic Plan Update include:

- The USDOT ITS evaluation framework be used for conducting evaluations of ITS projects in the MAG region;
- MAG should create a pool of funds for ITS evaluations. Similar to the FHWA evaluation model, the pooled evaluation funds will be used to evaluate a subset of the ITS projects funded in the MAG region;
- MAG should facilitate the use of evaluation results by serving as a clearinghouse for locally relevant evaluation results, encouraging the use of ITS evaluation results as a reference source early in the planning process, and identifying ITS knowledge gaps and opportunities to collect locally relevant evaluation data; and
- Universities (Arizona State University, Northern Arizona University, and the University of Arizona) should be involved as key partners in local and regional ITS evaluation programs.

ITS IMPLEMENTATION PLAN

An ITS Implementation Plan was developed to recommend ITS projects for possible inclusion in the MAG Regional Transportation Plan and Transportation Improvements Program (TIP). Projects were developed for a short-term (2002-2006), mid-term (2007-2011) and long-term (2012-2021) implementation and were designed to satisfy the ITS needs identified by the regional stakeholders,

correspond to the recommended National ITS Architecture market packages for the MAG region, and fit into the regional ITS architecture vision.

The following projects are recommended for deployment in the MAG region. More specific information about these projects, including implementation agency, managing and operating agency, costs and deployment timeframes, is included in the ITS Implementation Plan.

Traveler Information Systems – Integrate systems (FMS/AZTech/Highway Closure and Restriction System). Install AZTech workstations, implement arterial speed maps, and expand use of highway advisory radio.

Freeway Management System – Expand FMS components and coverage, provide link between Freeway Service Patrol and traffic management, upgrade ADOT's Traffic Operations Center, and provide travel time displays on VMS.

Arterial Management Systems – Expand/add arterial SMART Corridors, expand Roadway Condition Reporting System (RCRS), upgrade/add municipal Traffic Management Centers and traffic signal systems, and implement advanced railroad crossing warning devices, implement ITS pedestrian/bicycle projects.

Transit Management System – Implement transit signal priority program, provide arrival times at transit stops, integrate transit routing with incident information, and implement scheduling, trip planning and vehicle management system.

Incident, Emergency and Event Management Systems – Develop Regional Incident Management Plans, develop a Regional Incident Management Coalition, integrate traffic/emergency dispatch system, enhance Phoenix International Raceway Special Event Traffic Management System, continue to implement Sky Harbor Airport Parking Management System, and develop municipal parking and event traffic management systems.

Telecommunications Infrastructure – Implement regional WAN, expand network of fiber and conduit throughout region, and provide interconnectivity among local agencies (WAN and fiber).

Planning and Outreach Support – Develop local ITS deployment plans, update local and regional ITS strategic plans, develop a Regional Concept of Operations, facilitate ITS Training and Capacity Building Program for professionals in the region, develop and facilitate an ITS outreach program with local agencies and the public, and perform ITS project evaluations.

Commercial Vehicle Operations – Continue with the ADOT ITS/Commercial Vehicle Operations Program and implement appropriate ITS technologies on CANAMEX Corridor through the region.

Information Management – Expand and enhance regional archived data server.

The total costs in current dollars, of the short-term, mid-term, and long-term recommended projects are presented in **Table 3**.

Table 3 – Implementation Plan Project Costs

	Short-Term	Mid-Term	Long-Term	Totals
Total Freeway Management System:	$61,580,000	$44,650,000	$68,550,000	**$174,780,000**
Total Transit:	$35,000,000	$3,000,000	$7,000,000	**$45,000,000**
Total Other ITS Projects:	$26,652,500	$27,460,000	$51,350,00	**$105,462,500**
Total Implementation Plan:	**$123,232,500**	**$75,110,000**	**$126,900,000**	**$325,242,500**

ITS projects in the MAG 2001-2005 Draft TIP as well as projects recommended in the ITS Implementation Plan were reviewed to determine a recommended number of new full time employees that will be required to manage and operate the projects. The active management and operation of ITS is critical for these systems to deliver their intended services and benefits. The ITS Implementation Plan recommended that the MAG ITS Committee consider the management and operations of proposed systems as part of the project prioritization process.

Key recommendations from the ITS Implementation Plan component of the MAG ITS Strategic Plan Update include:

- Regionally significant ITS projects implemented in the MAG region should address the stakeholder needs of the region. Locally significant ITS projects should address local needs and support regional objectives.
- All ITS projects implemented in the MAG region should be consistent with the regional architecture that has been adopted by the MAG ITS Committee.
- The MAG ITS Committee should continue to prioritize ITS projects for both regional and local needs. Projects that have been recommended in the ITS Implementation Plan are intended to meet regional stakeholder needs. The MAG ITS Committee should consider incorporating as many of these projects as possible into the TIP to better address the regional needs of stakeholders in the MAG region.
- An agency submitting an ITS project for inclusion in the TIP should address the staffing requirements and management and operations required for the project. The MAG ITS Committee should consider the management and operations of an ITS project as part of project prioritization.
- The MAG ITS Committee should modify the ITS Project Rating System so that projects included in the ITS Implementation Plan may receive additional points to encourage their implementation.
- The MAG ITS Committee should request additional funding from the MAG Regional Council to assist in implementing projects in the ITS Implementation Plan.